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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/791,751

03/04/2004

Kazuo Tomita

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06/05/2006

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EXAMINER

CHU, CHRIS C

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 06/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/791,751

Applicant(s)

TOMITA ET AL.

Examiner

Chris C. Chu

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 13 - 31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 13 - 31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 3/9/06.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's request filed on December 27, 2005, for suspension of action with the RCE in this application under 37 CFR 1.103(a), is approved. Therefore, applicant's supplemental amendment filed on February 7, 2006 has been received and entered in the case.

2. Furthermore, applicant's supplemental amendment filed on February 7, 2006 includes the termination of the suspension of action. Thus, the previous Office action mailed before the termination of the suspension of action is withdrawn.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 13, 16 – 19 and 22 – 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Yang et al. (U. S. Pat. No. 6,468,894).

Regarding claim 13, Yang et al. discloses in e.g., Fig. 12 an interconnecting structure (the structure in Fig. 12) comprising:

- a first dielectric film (56; column 5, line 60);
- a first wiring conductor (54; column 5, line 59) in the first dielectric film (56);

- a second dielectric film (57; column 6, lines 3 and 4) on the first wiring conductor and on the first dielectric film (see e.g., Fig. 12);
- a third dielectric film (58; column 5, line 67) on the second dielectric film (see e.g., Fig. 12);
- a via (70; column 6, line 31) in the second dielectric film (57) and a first portion of the third dielectric film (see e.g., Fig. 12), the via (70) being connected to the first wiring conductor (see e.g., fig. 12);
- a second wiring conductor (64; column 6, line 37) in a second portion of the third dielectric film (58; see e.g., Fig. 12), on the via (70), the second wiring conductor (64) being connected to the via (70; see e.g., Fig. 12); and
- a dummy conductor (68 and 66; column 6, lines 26 and 31) in the second (57) and third (58) dielectric films, the dummy conductor contacting the first dielectric film (see e.g., Fig. 12).

Regarding claims 16 and 23, Yang et al. discloses in e.g., Fig. 12 the first wiring conductor (54) being covered with the second dielectric film (57; see e.g., Fig. 12).

Regarding claims 17 and 24, Yang et al. discloses in e.g., Fig. 12 the second dielectric film (57) being thinner than the third dielectric film (58; see e.g., Fig. 12).

Regarding claims 18 and 25, Yang et al. discloses in e.g., Fig. 12 the dummy conductor (68 and 66) being not connected to any wiring conductor (see e.g., Fig. 12).

Regarding claim 19, Yang et al. discloses in e.g., Fig. 12 an interconnecting structure comprising:

- a semiconductor substrate (50; column 5, line 58 and column 1, lines 6 – 9);

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- a first dielectric film (56) supported by the semiconductor substrate (50);
- a first wiring conductor (54) in the first dielectric film (56);
- a second dielectric film (57) on the first wiring conductor (54) and on the first dielectric film (56; see e.g., Fig. 12);
- a third dielectric film (58) on the second dielectric film (57);
- a second wiring conductor (70 and 64) in the second (57) and third (58) dielectric films (see e.g., Fig. 12), the second wiring conductor (70 and 64) being connected to the first wiring conductor (54; see e.g., Fig. 12); and
- a dummy conductor (68 and 66) in the second (57) and third (58) dielectric films (see e.g., Fig. 12), the dummy conductor (68 and 66) contacting the first dielectric film (56; see e.g., Fig. 12).

Regarding claim 22, Yang et al. discloses in e.g., Fig. 12 the second wiring conductor (70 and 64) having a wiring portion (64) and a via portion (70), and the via portion (70) connecting the first wiring conductor (54) to the wiring portion (64; see e.g., Fig. 12).

### *Claim Rejections - 35 USC § 103*

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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6. Claims 14, 15, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. in view of Boeck et al. (U. S. Pat. No. 5,880,018).

Regarding claims 14, 15, 20 and 21, while Yang et al. discloses the use of the first and second dielectric films, Yang et al. does not disclose the material of the first (claims 15 and 21) and second (claims 14 and 20) dielectric films including nitrogen atoms. Boeck et al. teaches in e.g., Fig. 3 first (12; i.e., nitride layer, column 3, lines 41 – 45) and second (16; i.e., SiON, column 3, lines 53 – 60) dielectric films including nitrogen atoms. It would have been obvious to one of ordinary skill in the art at the time when the invention was made to apply the materials of the Boeck et al. into the first and second dielectric films of Yang et al. as taught by Boeck et al. to improve the mechanical strength of the inter-metal dielectric layers and to improve the thermal dissipation (column 1, lines 36 – 50).

7. Claims 26 and 29 – 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. in view of Tsai (U. S. Pat. No. 6,295,721).

Regarding claim 26, Yang et al. discloses in e.g., Fig. 12 an interconnecting structure comprising:

- a semiconductor substrate (50);
- a first dielectric film (56) supported by the semiconductor substrate (50);
- a first wiring conductor (54) in the first dielectric film (56);
- a second dielectric film (57) on the first wiring conductor (54) and on the first dielectric film (56);
- a third dielectric film (58) on the second dielectric film (57);

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- a second wiring conductor (70) in the second (57) and third (58) dielectric films (see e.g., Fig. 12), the second wiring conductor (70) being connected to the first wiring conductor (54; see e.g., Fig. 12); and
- a plurality of dummy conductors (68, 66 and 72) in the second (57) and third (58) dielectric films (see e.g., Fig. 12), each of the dummy conductors (68, 66 and 72) contacting the first dielectric film (56; see e.g., Fig. 12).

Yang et al. does not disclose a specific arrangement of the plurality of dummy conductors. Tsai teaches in e.g., Fig. 1 and Fig. 6 a plurality of dummy conductors (13; column 2, lines 3 – 8) being arranged around a second wiring conductor (12). It would have been obvious to one of ordinary skill in the art at the time when the invention was made to apply the specific arrangement of the dummy conductors of the Tsai into the structure of Yang et al. as taught by Tsai to improve resistant to delamination and scratching by terminating the propagation of cracks in dielectric layer (column 2, lines 6 – 8).

Regarding claim 29, Yang et al. discloses in e.g., Fig. 12 the first wiring conductor (54) being covered with the second dielectric film (57; see e.g., Fig. 12).

Regarding claim 30, Yang et al. discloses in e.g., Fig. 12 the second dielectric film (57) being thinner than the third dielectric film (58; see e.g., Fig. 12).

Regarding claim 31, Yang et al. discloses in e.g., Fig. 12 the dummy conductor (68 and 66) being not connected to any wiring conductor (see e.g., Fig. 12).

8. Claims 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. and Tsai as applied to claim 26 above, and further in view of Boeck et al.

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Regarding claims 27 and 28, while Yang et al. and Tsai disclose the use of the first and second dielectric films, Yang et al. and Tsai do not disclose the material of the first (claim 28) and second (claim 27) dielectric films including nitrogen atoms. Boeck et al. teaches in e.g., Fig. 3 first (12; i.e., nitride layer, column 3, lines 41 – 45) and second (16; i.e., SiON, column 3, lines 53 – 60) dielectric films including nitrogen atoms. It would have been obvious to one of ordinary skill in the art at the time when the invention was made to further apply the materials of the Boeck et al. into the first and second dielectric films of Yang et al. and Tsai as taught by Boeck et al. to improve the mechanical strength of the inter-metal dielectric layers and to improve the thermal dissipation (column 1, lines 36 – 50).

### *Response to Arguments*

9. Applicant's arguments with respect to newly submitted claims 13 – 31 have been considered but are moot in view of the new ground(s) of rejection.

### *Conclusion*

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is 571-272-1724. The examiner can normally be reached on 11:30 - 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on 571-272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

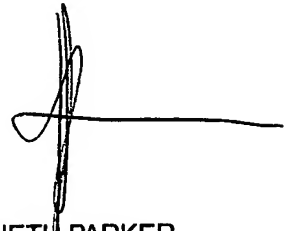


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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chris C. Chu  
Examiner  
Art Unit 2815

c.c.  
Monday, May 15, 2006

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke extending to the right.

KENNETH PARKER  
SUPERVISORY PATENT EXAMINER